

# **FHWA-47 REPORT**

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## **FEDERAL-AID HIGHWAY CONSTRUCTION**

### **MATERIALS USAGE FACTORS**

**2001-2002-2003**

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**Source: HIPA-10, Office of Program Administration**





U.S. Department  
of Transportation

**Federal Highway  
Administration**

# Memorandum

Subject: **ACTION:** Federal-Aid Highway Construction  
Materials Usage Factors 2001-2002-2003

Date: **AUG 15 2005**

From: Dwight A. Horne *Dwight L. Horne*  
Director, Office of Program Administration

Reply to  
Attn. of: HIPA-10

To: Division Administrators  
Appalachian States

The materials usage data summarized herein is compiled from reports (Form FHWA-47, Statement of Materials and Labor Used By Contractors on Highway Construction Involving Federal Funds) prepared by contractors upon completion of Federal-aid highway construction contracts and submitted to Headquarters during calendar years 2001-2002-2003.

The data is intended to aid materials suppliers, highway contractors, engineers, economists and others planning to meet the needs of the highway construction program in the United States.

Similar data has been published annually in the past using an expanded format series of four pamphlets. The first pamphlets covered the 1953-54-55 period and the "Bulletin" issues covered the 1982-83-84 period through the 1995-96-97 period. The most recent issue will be in the current format. Copies of these older issues can be obtained by contacting the Federal Highway Administration, Office of Program Administration Washington, D.C. 20590.

enclosures





## HOW TO USE THESE FACTORS

This information was compiled from reports received during 2001-2002-2003 from highway contractors upon completion of Federal-aid highway projects on the National Highway System (NHS). Contracts on the NHS less than \$1.0 million as well as all non-NHS projects are not included. For the 2001-2002-2003 period, materials usage was reported for approximately 2,098 projects completed at a total cost of about \$12.3 billion.

These materials usage factors are quotients obtained when the total quantity reported for a particular material is divided by the \$12.3 billion total cost of all projects reported. The quotients or factors are reported in terms of quantity (ton, LF, gal, etc.) per \$1.0 million of total project cost. As such, the factors represent usage based on the value of the construction dollar at the time these contracts were awarded. Factors for more recent contracts can be expected to reflect changes in the purchasing power of the construction dollar.

Investigations have shown that for comparable standards of design, materials usage factors on non-Federal-aid projects do not differ appreciably from those developed for Federal-aid construction. These factors may thus be applied generally to any program of highway construction expenditures to obtain an estimate of material needs. Estimated construction expenditures for all public highways by year and by state are shown on Pages 5 and 6.

It should be recognized that the factors shown for individual States may not always be truly representative of normal usage if they are based on comparatively low volumes of work and/or temporary disproportionate cost distributions of the three major highway construction operations, i.e., grading, surfacing and structures. In most States, however, during the 3-year period, the volume of work is large enough and the operational distribution is of proper proportion to reflect representative usage factors.

For further information, contact

Office of Infrastructure  
Office of Program Administration  
(202) 366-4636

U. S. AVERAGE  
HIGHWAY CONSTRUCTION MATERIALS USAGE FACTORS  
QUANTITIES OF MATERIALS PER MILLION DOLLARS CONTRACT CONSTRUCTION COST  
3-YEAR FACTORS

YEARS	CEMENT	BITUMEN	AGGREGATES			STEEL					CONCRETE PIPE	CLAY PIPE	LUMBER	PETROLEUM PRODUCTS
			PURCHASED BY CONTRACTOR	PRODUCED BY CONTRACTOR	TOTAL	STRUCTURAL STEEL	REINFORCED STEEL	CORRUGATED STEEL	MISC. STEEL	TOTAL STEEL				
			Thous Tons	Thous T	Thous Tons	Tons	Tons	Tons	Tons	Tons				
2001-02-03	457	332	12	3	15	18	37	1	2	58	52	0	2	18
2000-01-02	446	331	12	3	15	17	38	1	3	59	51	0	3	19
1999-00-01	457	344	12	3	15	18	40	1	3	62	55	0	3	20
1998-99-00	450	350	12	3	15	19	41	1	2	63	58	0	3	21
1997-98-99	472	346	13	3	16	21	43	2	2	68	63	0	4	21
1996-97-98	498	338	13	3	16	23	42	2	3	70	67	0	5	21
1995-96-97	738	442	14	3	17	24	45	2	3	74	73	0	7	23
1994-95-96	855	455	15	4	19	25	46	2	4	77	76	1	8	25
1993-94-95	1274	452	16	4	20	27	48	2	4	81	79	1	8	26
1992-93-94	669	359	25	4	29	28	51	2	5	86	82	1	8	26
1991-92-93	603	351	14	4	18	33	50	2	5	90	85	2	7	25
1990-91-92	629	376	15	5	20	33	49	3	4	89	87	3	7	25
1989-90-91	660	382	15	5	20	33	48	3	4	88	88	4	6	26
1988-89-90	693	404	16	5	21	28	48	3	3	82	90	5	6	28
1987-88-89	689	403	15	5	20	29	49	3	3	84	92	6	6	31
1986-87-88	665	456	16	6	22	30	46	4	3	83	93	6	6	33
1985-86-87	621	476	15	6	21	37	46	4	4	91	94	6	6	34
1984-85-86	545	490	15	6	21	43	46	4	5	98	94	5	6	36
1983-84-85	554	462	15	6	21	50	51	4	6	111	96	5	10	38
1982-83-84	560	445	15	7	22	56	55	5	5	121	99	5	11	40
1981-82-83	583	462	16	6	22	58	58	5	5	126	110	5	12	44
1980-81-82	625	500	17	7	24	60	59	7	5	131	123	5	10	48
1979-80-81	728	564	20	7	27	62	69	8	6	145	134	6	12	54
1978-79-80	905	612	23	9	32	68	84	9	7	168	154	7	16	62
1977-78-79	1016	628	24	10	34	78	98	9	8	193	165	7	18	67
1976-77-78	1101	633	24	11	35	89	106	11	9	215	181	7	19	76
1975-76-77	1142	676	25	12	37	96	113	12	11	232	189	7	22	80
1974-75-76	1206	703	27	15	42	126	127	13	12	278	201	8	30	87
1973-74-75	1349	753	29	17	46	140	145	14	14	313	223	9	38	89
1972-73-74	1560	768	30	18	48	148	172	14	15	349	254	11	40	93

FOOTNOTES:

Cement includes Portland and natural cement for all highway uses except concrete culvert.  
 Bitumen includes liquid asphalts (primers, tacks, etc.) and asphaltic cement used in bituminous concrete.  
 Aggregates purchased include aggregates in ready-mixed concrete and bituminous paving materials.  
 Structural steel includes shapes, plates, H-piles and sheet piles.  
 Reinforcing steel includes plain and epoxy-coated rebars used in pavements and structures.  
 Corrugated steel culvert includes CM pipe, structural plate pipe and pipe arches.  
 Miscellaneous steel includes steel pipe, manhole covers, joint devices, tubular piles, nails, etc.  
 Concrete pipe includes plain and reinforced pipe. Culvert reinforcement is about 2% weight of pipe.  
 Lumber includes plywood, pressed wood and other form lumber, falsework, bridge timbers and flooring, guardrail and fence posts, etc. - timber piles are not included.  
 Petroleum products include gasoline, lubricating oil, grease (8 Lbs/Gal), diesel fuel, fuel oil, etc.

Where "0" appears, quantities reported were negligible; "-" represents no data reported.

STATE - BY - STATE  
HIGHWAY CONSTRUCTION MATERIALS USAGE FACTORS  
QUANTITIES OF MATERIALS PER MILLION DOLLARS CONTRACT CONSTRUCTION COST  
2001-02-03

			AGGREGATES			STEEL								
STATE	CEMENT	BITUMEN	PURCHASED BY CONTRACTOR	PRODUCED BY CONTRACTOR	TOTAL	STRUCTURAL STEEL	REINFORCED STEEL	CORRUGATED STEEL CULV	MISC STEEL	TOTAL STEEL	CONCRETE PIPE	CLAY PIPE	LUMBER	PETROLEUM PRODUCTS
	Tons	Tons	Thous Tons	Thous Tons	Thous Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	MBF	Thous Gals
Alabama	142	676	16	0	16	3	20	0	1	24	90	-	1	22
Alaska	15	204	2	12	14	2	1	13	4	20	-	-	1	19
Arizona	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arkansas	557	299	12	3	15	47	40	1	7	95	29	-	3	26
California	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Colorado	445	370	12	5	17	3	23	1	0	27	43	-	1	19
Connecticut	42	784	13	0	13	21	9	-	1	31	2	-	0	19
Delaware	103	951	16	0	16	0	3	-	0	3	153	-	0	13
Wash., D.C.	105	6	1	0	1	9	19	-	39	67	1	-	11	4
Florida	135	286	12	0	12	58	29	1	1	89	78	-	1	21
Georgia	122	520	13	0	13	7	15	0	2	24	34	-	2	16
Hawaii	127	86	4	1	5	0	5	-	0	5	27	0	1	6
Idaho	82	280	21	27	48	1	5	5	2	13	0	-	1	29
Illinois	263	396	11	1	12	13	16	1	1	31	48	0	2	12
Indiana	586	315	15	1	16	15	16	1	1	33	28	0	1	10
Iowa	822	231	19	1	20	21	32	1	2	56	55	0	1	28
Kansas	777	246	12	2	14	11	31	1	1	44	28	-	2	26
Kentucky	516	371	10	2	12	2	18	1	0	21	3	-	0	5
Louisiana	466	481	10	1	11	5	20	0	0	25	10	-	4	9
Maine	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maryland	88	122	6	0	6	1	2	-	0	3	-	-	1	9
Massachusetts	109	68	4	0	4	33	13	0	1	47	30	-	5	4
Michigan	1000	270	15	1	16	10	13	2	4	29	50	-	1	12
Minnesota	165	1731	8	21	29	25	12	-	0	37	37	-	0	15
Mississippi	141	421	16	4	20	15	28	0	1	44	67	-	0	24
Missouri	442	277	9	1	10	36	30	1	4	71	54	0	3	17
Montana	171	724	6	17	23	3	7	4	0	14	81	-	0	24
Nebraska	248	543	15	0	15	11	22	1	0	34	25	-	4	33
Nevada	424	259	5	11	16	11	67	0	1	79	26	-	0	18
New Hampshire	123	254	18	2	20	20	11	1	1	33	101	-	1	24
New Jersey	107	138	5	0	5	26	16	0	0	42	56	-	4	6
New Mexico	79	258	0	34	34	1	2	15	1	19	-	-	0	92
New York	78	539	12	0	12	16	6	0	2	24	6	-	0	14
North Carolina	18	370	5	0	5	0	4	2	0	6	56	-	0	31
North Dakota	675	513	18	20	38	2	19	1	0	22	49	-	1	36

STATE-BY-STATE  
HIGHWAY CONSTRUCTION MATERIALS USAGE FACTORS  
QUANTITIES OF MATERIALS PER MILLION DOLLARS CONTRACT CONSTRUCTION COST  
2001-02-03

STATE	CEMENT	BITUMEN	AGGREGATES			STRUCTURAL STEEL	REINFORCED STEEL	CORRUGATED STEEL CULV	MISC STEEL	TOTAL STEEL	CONCRETE PIPE	CLAY PIPE	LUMBER	PETROLEUM PRODUCTS
			PURCHASED BY CONTRACTOR	PRODUCED BY CONTRACTOR	TOTAL									
	Tons	Tons	Thous Tons	Thous Tons	Thous Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	MBF	Thous Gals
Ohio	291	438	13	0	13	28	30	0	4	62	22	1	4	9
Oklahoma	1,014	443	15	1	16	7	24	3	2	36	54	-	1	19
Oregon	132	564	12	6	18	6	17	2	1	26	23	-	2	19
Pennsylvania	463	229	12	2	14	20	20	1	3	44	37	1	2	14
Rhode Island	184	269	6	2	8	12	12	0	1	25	58	0	4	27
South Carolina	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Dakota	861	395	13	6	19	13	54	1	9	77	54	-	1	29
Tennessee	254	561	21	0	21	29	36	0	3	68	65	-	1	9
Texas	615	271	12	1	13	19	88	0	0	107	90	-	2	19
Utah	439	354	15	8	23	9	13	3	0	25	14	-	6	14
Vermont	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Virginia	0	242	17	0	17	0	0	-	0	0	67	-	0	3
Washington	236	525	11	4	15	19	27	1	0	47	15	-	3	19
West Virginia	162	258	6	0	6	12	17	2	0	31	15	-	2	26
Wisconsin	547	178	10	1	11	25	25	1	11	62	72	-	1	15
Wyoming	109	644	4	12	16	6	14	1	1	22	16	-	3	39
Puerto Rico	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U.S. AVERAGES														
2001-02-03	457	332	12	3	15	18	37	1	2	58	52	0	2	18
2000-01-02	446	331	12	3	15	17	38	1	3	59	51	0	3	19
1999-00-01	457	344	12	3	15	18	40	1	3	62	55	0	3	20
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 Petroleum products include gasoline, lubricating oil, grease (8 Lbs/Gal), diesel fuel, fuel oil, etc.

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<u>Year</u>	<u>\$ Billion</u>	<u>Year</u>	<u>\$ Billion</u>
1944	0.336	1969	8.128
1945	0.331	1970	9.235
1946	0.719	1971	9.868
1947	1.267	1972	9.789
1948	1.620	1973	9.722
1949	1.939	1974	10.962
1950	2.069	1975	12.224
1951	2.273	1976	11.806
1952	2.597	1977	10.848
1953	2.989	1978	12.663
1954	3.670	1979	15.104
1955	3.915	1980	17.449
1956	4.043	1981	16.951
1957	4.586	1982	15.678
1958	5.055	1983	16.578
1959	5.238	1984	19.169
1960	4.913	1985	22.095
1961	5.301	1986	24.054
1962	5.727	1987	25.274
1963	6.256	1988	27.226
1964	6.488	1989	27.028
1965	6.494	1990	28.190
1966	7.207	1991	28.997
1967	7.532	1992	28.825
1968	8.112	1993	30.906
		1994	33.494
		1995	35.084
		1996	37.414
		1997	38.063
		1998	41.194
		1999	45.840
		2000	49.730
		2001	52.828
		2002	55.417
		2003	56.619*

\* Preliminary

\*\* Forecast No longer available

SOURCE: FHWA, Office of Highway Information Management,  
Highway Funding and Motor Fuels Division

**Total Estimated Construction Expenditures for All Public Highways by State 1/**  
(Thousands of Dollars)

Preliminary 2/

	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>
Alabama	561,383	705,503	905,862	949,053	939,987
Alaska	233,509	306,359	272,834	330,154	390,206
Arizona	1,198,434	1,165,382	1,251,664	1,537,217	1,412,011
Arkansas	384,356	438,862	591,563	798,935	727,784
California	3,728,853	4,031,492	4,316,250	4,595,050	5,159,261
Colorado	854,163	840,486	1,123,147	1,205,046	1,109,176
Connecticut	427,704	454,846	425,693	482,188	469,595
Delaware	180,846	237,747	285,870	204,330	172,884
Dist. of Columbia	134,318	168,598	265,495	272,317	281,283
Florida	2,064,627	2,127,992	2,359,989	2,885,309	3,137,297
Georgia	1,354,244	1,299,199	1,418,416	1,295,237	1,273,085
Hawaii	160,341	138,755	174,486	180,172	194,395
Idaho	271,692	286,866	272,884	306,886	329,457
Illinois	1,348,513	1,719,437	2,270,251	2,588,560	2,836,646
Indiana	781,586	1,052,066	2,196,764	958,286	1,131,719
Iowa	670,494	824,445	714,953	773,900	851,855
Kansas	685,103	695,229	721,737	731,202	781,880
Kentucky	806,599	1,184,470	1,081,997	1,179,495	1,212,198
Louisiana	706,777	750,735	561,672	779,670	903,695
Maine	186,705	203,679	177,910	274,431	242,705
Maryland	641,809	666,557	780,677	909,005	918,339
Massachusetts	2,515,344	2,068,341	1,886,170	1,653,260	1,420,582
Michigan	1,546,600	1,667,278	1,901,342	1,854,266	1,878,346
Minnesota	1,215,065	1,383,378	1,405,079	1,495,091	1,457,254
Mississippi	616,269	626,311	520,514	665,747	611,185
Missouri	974,133	1,109,416	1,235,824	1,292,393	1,275,923
Montana	224,084	260,455	222,611	280,141	308,497
Nebraska	421,731	469,534	368,492	414,380	442,181
Nevada	317,924	353,680	283,548	363,054	419,685
New Hampshire	135,934	130,579	151,493	130,441	124,216
New Jersey	1,276,909	1,790,484	1,354,290	1,787,841	1,843,641
New Mexico	576,079	507,504	737,808	504,453	505,343
New York	3,478,078	3,504,674	3,590,554	4,058,554	3,828,080
North Carolina	1,141,713	1,207,321	1,280,004	1,365,448	1,492,343
North Dakota	255,590	206,053	239,332	277,752	295,905
Ohio	1,683,390	1,873,068	1,777,351	1,848,182	1,855,836
Oklahoma	661,031	789,930	822,888	661,030	599,842
Oregon	494,041	473,609	551,535	491,528	630,357
Pennsylvania	1,655,074	1,952,117	2,384,328	2,264,155	2,352,098
Rhode Island	107,629	90,265	85,305	107,963	102,684
South Carolina	423,346	436,978	514,762	632,674	568,337
South Dakota	244,513	304,014	323,682	322,835	301,638
Tennessee	600,628	694,437	692,521	673,094	676,263
Texas	3,168,537	3,573,956	3,461,644	3,802,810	4,332,834
Utah	775,415	720,383	519,390	540,330	436,710
Vermont	135,245	148,530	128,383	118,911	152,144
Virginia	1,187,064	1,100,960	1,139,619	1,217,763	909,915
Washington	849,365	922,894	894,016	1,183,059	1,245,151
West Virginia	430,512	497,492	612,087	517,695	412,424
Wisconsin	1,101,135	1,229,687	1,212,519	1,274,397	1,231,179
Wyoming	246,360	261,211	210,651	263,812	286,190
Undistributed	0	76,800	151,119	118,030	147,500
Total	45,840,794	49,730,044	52,828,974	55,417,529	56,619,738

1/ Includes estimates prepared by Federal Highway Administration.

2/ State expenditures are final. Federal and local government expenditures are estimated.